



Major	Mechanical Engineering		
Master's program	MECHANICS OF MATERIALS FOR ENGINEERING AND INTEGRITY OF STRUCTURES		
Master's Code	MAGIS		
<i>Qualification awarded</i>	Master's degree in Mechanical Engineering		
<i>Program director</i>	Xavier COLIN (xavier.colin@ensam.eu)		
<i>Mode of study</i>	<i>Level of qualification</i>	<i>Field of study</i>	<i>Language of study</i>
Full time	Master ISCED 7	Engineering ISCED-F-07	English
<i>ECTS</i>	<i>Campus</i>	<i>Length of programme</i>	<i>Specific arrangements for recognition of prior learning</i>
60	Paris	End of September to end of February (courses) Early March to end of August (Master Thesis)	No
<i>Keywords</i>	Materials science – Engineering and solid mechanics – Innovative manufacturing processes – Metal, polymers and composites – Heterogeneous and architecture materials - Numerical methods – Artificial intelligence – Advanced experimental methods – Advanced Machining and its application – Casting and forge – Additive manufacturing – Life cycle analysis – Materials for eco-design – Multiphysical analysis and modelling – Fatigue and durability		

Admission requirements

Type	Level	Way
English proficiency	Level B2	Certificate
Previous degree	First year of Master of Science degree	Certificate of achievement

Applicants interested in the MAGIS programme must follow the online procedure and adhere to the schedule.

<https://artsetmetiers.fr/en/formation/master-admissions>

Overall objectives

MAGIS is a second-year Master's program aimed at providing students with a deeper understanding of the fundamentals of materials science and engineering and solid mechanics, as well as a better knowledge of the relationships between the manufacturing processes, the material, its microstructure and its mechanical properties. To illustrate these concepts, the program draws on recent developments in this field, carefully selected from advanced industrial applications and innovative manufacturing technologies. The emphasis is on generic methods, based on fundamental principles and mechanisms, rather than on the specific characteristics of materials.

This general approach in solid mechanics applies to a wide variety of materials (ceramics/glasses, metals, polymers, composites) and gives a complete understanding of the mechanical design and sizing of industrial systems (transport vehicles, nuclear power-plants, etc.) under various and complex external loadings. Students are learned to scientific methodology, ranging from advanced experimental methods to modeling and simulation of the mechanical behavior of structures, through the analysis of the mechanisms involved throughout the material life cycle, including their couplings.

This approach is deployed along three different tracks: machining and simulation (MASI), metal processing and additive manufacturing (MPAM), and life cycle of polymers and composites (LCPC).





Program learning goals

The table below details the abilities to be acquired and the expected proficiency levels according to the following grading scale:

- 1) Lead an innovative approach in a disciplinary field that takes into account the complexity of the situation by using information that may be incomplete or seems to be contradictory
- 2) Lead a research project (design, fulfilment and management, evaluation, dissemination) that can mobilize multidisciplinary skills in a collaborative framework, and accept responsibilities
- 3) Adapt to different socio-professional and intercultural, but also national and international contexts
- 4) Update their knowledge in a specialized scientific field by performing a thorough literature review (state of the art)
- 5) Communicate clearly and concisely (by talk, poster, written report, etc.) in English in front of an audience of specialists and non-specialists.

Sets of expected abilities	Expected abilities	Expected proficiency level
		R&D
<i>Disciplinary knowledge and reasoning</i>	1.1 Knowledge of underlying mathematics and science	
	1.2 Core fundamental knowledge of engineering	X
	1.3 Advanced engineering fundamental knowledge, methods and tools	
<i>Personal and professional skills attributes</i>	2.1 Analytical reasoning and problem solving	
	2.2 Experimentation, investigation and knowledge discovery	X
	2.3 System thinking	
	2.4 Ethics, though and learning	
	2.5 Ethics, equity and other responsibilities	
<i>Interpersonal skills: Teamwork and communication</i>	3.1 Teamwork	
	3.2 Communications	
	3.3 Communications in foreign language	
<i>Conceiving, Designing, implementing, operating, innovating and entrepreneurship in the context of Corporate Social Responsibility</i>	4.1 External, societal and environmental context	
	4.2 Enterprise and business context	
	4.3 Conceiving, systems engineering and management	
	4.4 Designing	
	4.5 Implementing	
	4.6 Operating	X
	4.7 Leading engineering endeavours	
	4.8 Engineering entrepreneurship	

More specifically, the **key strengths** of the MAGIS programme are as follows:

Program structure

Study and assessment rules

Each module can be evaluated by means of tutorials, practical works, projects, reports, poster or oral presentations, and/or exams, and the assessment rules are explained at the beginning of the programme. Each module is evaluated between 0 and 20.

For all modules, the research project and the master thesis, to validate the ECTS, the final mark should be ≥ 10 . There is no compensation between modules.

Resit exams are organized at the beginning of the second semester (at the end of March).

Graduation requirements

To be graduated, students need to comply with the following rules:

- Validate 30 ECTS during the first semester, with a final average ≥ 10 and no mark < 7 .
- Validate 30 ECTS during the second semester, with a final average ≥ 10 and no mark < 7 .

At the end of the MAGIS program, the final average is calculated from the average of two semesters, and different honours are awarded (highest honours, high honours, honours) only to students who have no mark < 10 .

Careers of graduates and access to further studies

Depending on their results and professional expectations, graduate students can continue their professional careers as a:

- PhD student in industry (CIFRE) or in academia to further investigate and work on up-to-date scientific challenges and thus, become a recognized expert. This is a preliminary step to reach a position of researcher or professor in France or abroad.
- Positions in large companies or start-ups (researcher in R&D laboratory, mechanical design engineer, production workshop manager, project manager, consultant, head of R&D department, etc.) in many industrial fields (aeronautics and space, automotive, building and civil engineering, energy, electricity, nuclear, health, manufacturing, etc.).